# III. Work/QA Plan Short Form

Title Page

Wells 6+4
10.11
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SDMS DOCID 549673

Unifirst Corporation
Monitoring Well Sampling

U.S. EPA, Region I Environmental Service Division Water Section

(Responsible Agency)

(Project Officer's Signature)	Bubara heuman
(Project Officer's Name)	Barbara Newman

Office of Quality Assurance Acceptance

Signature \_\_\_\_\_

Date

11/17/87

Project Name: UniFirst Corporation Site
Site Number: 46

2. Project Reguested by: Barbara Newman

3. Date of Request: November 9, 1987

4. Date of Project Initiation: November 9,1987

5. Project Officer: Barbara Newman

6. Quality Assurance Officer: Edward J. Kim

### 7. Project Description

# A. Objective and Scope Statement:

As a follow up to MA Superfund Section's continuing actions on UniFirst Corporation property and the potential for a removal action at the site, ESD Water Section personnel at the request of the site Project Officer will conduct a round of ground water sampling investigation at the site.

The nature and extent of volatile organic compounds contamination in the bedrock underlying the UniFirst Corporation property will be investigated. Proposed is the sampling of six monitoring wells (UC4, UC5, UC6, UC7, UC9, UC10) and analyzing the ground water samples for volatile organic compounds. Figure I. illustrates the approximate locations of the wells to be sampled.

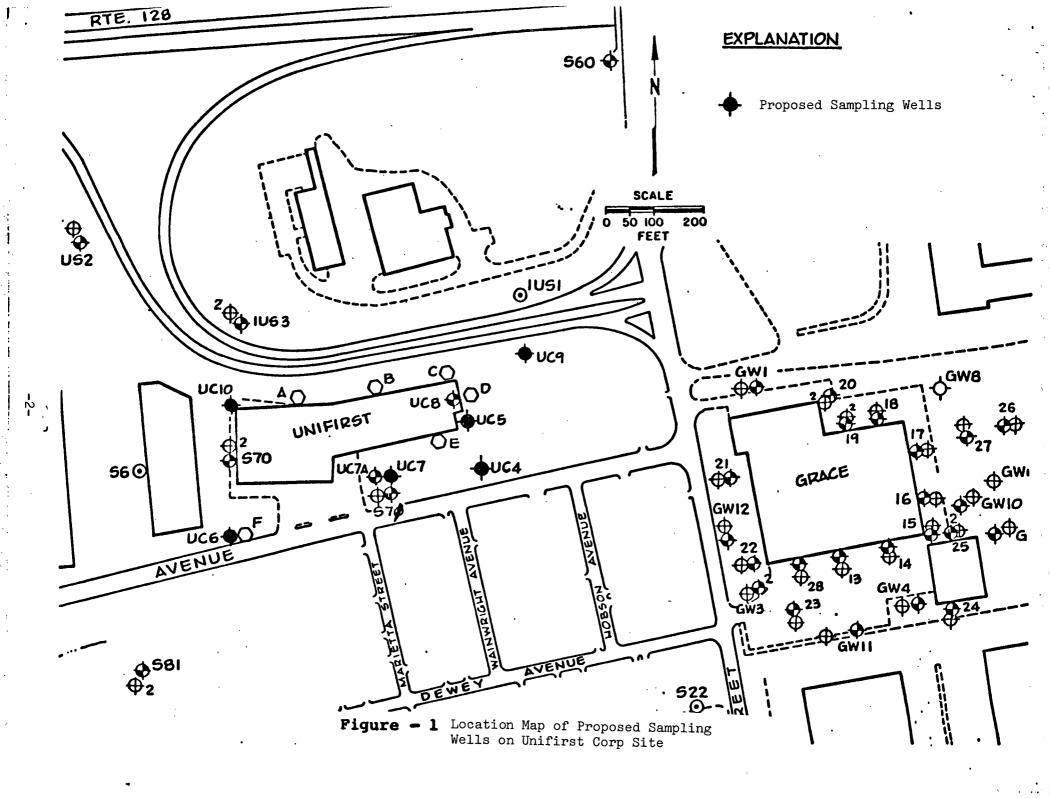
The data will be used to determine if the contaminants of concern are present and above detection limits at the sampling locations.

### B. Project Task Schedule:

The start date is contingent upon Quality Assuarance Officer's approval of this Work/QA Plan and laboratory avalibility to handle the samples. It is anticipated the start date will commence within two weeks upon the approval of this Work/QA Plan.

### C. Data Usage:

As discussed above in Section 7.A, it is intended that the data gathered during this investigation will be utilized to evaluate the potential impacts of the site on ground water quality on site and assess the effects of any ground water contamination to public health or the environment. More specifically, the data will be used to:



- 1. To better delineate on-site, the composition and concentration of ground water contamination originating at the site; and identify the nature and extent of the hazard to public health and the environment related to the site.
- 2. Provide current EPA data to compare with existing Unifirst Corp databases regarding the extent and degree of ground water contamination at the site.

## D. Monitoring Network, Analysis Design and Rationale:

Six ground water monitoring wells, including 3 multi-level sampling wells, each with 6 levels, are proposed to be sampled during the investigation (refer to Figure I. for locations). It is assumed that approximately 21 ground water samples, plus a trip blank (1 per sampling day), 10% field duplicates (2 of 21) identified to the lab for field QC and 1 field equipment blank (1 per sampling day) unidentified to the lab for field QC, will be submitted to NERL for volatile organic analysis (compounds to be identified are listed in Attachment A).

### E. Monitoring Parameter and Their Frequency of Collection:

The ground water samples collected will be analyzed for volatile orgainc compounds. Qualitative analysis EPA Method 8240 shall be used. This method covers the determination of a number of purgeable organics. Attachment A. lists the parameters that will be determined by this method. The method detection limit for each parameter is also included in Attachment A. In addition, an informal HNu headspace analysis will be performed in the field on a sample of ground water from each well in order to gain a qualitative indication of the concentration, if any, of dissolved volatile compounds.

24 samples for volatile organic compounds will collected, included are 1 trip blank, 2 duplicates and 1 field blank.

### F. Parameter Table:

Parameter to be Analyzed	Number of Samples	Analytical Method Reference	Containers (each sample)	Preservation	Sample Holding Time
Water	21 samples, 1 trip blank,	EPA Method 8240	2 40 ml VOA Vials	Cool 4 <sup>o</sup> C, 4 drops of	l4 days to analysis
VOC	2 duplicates, & 1 field blank			conc. HCL	

### 8. Schedule of Tasks and Products:

The investigation will commence when the QA/Work Plan receives written approval from the Quality Assurance Officer. The table below illustrates the estimated schedule for completion of the proposed work.

Although time requirements for several of the individual tasks can be estimated accurately, some of the task schedules depend upon several variables, including: (1) Quality Assurance Officer reveiw and approval of the QA/Work Plan; (2) completion of preceding tasks; (3) availability of laboratory to analyze the samples; and (4) weather conditions. The estimated schedule does not take into account delays due to weather nor excessive delays due to unforeseen field conditions. Otherwise, the estimated schedule includes reasonable allowances for the variables identified above.

Dates	Activities	
Nov. 9-13	Initate project; develop QA/Work Plan and receipt Quality Assurance Officer approval	
Nov. 13	Schedule laboratory support (NERL)	
Nov. 30	Conduct well sampling and deliver to NERL	
Nov. 30 - Dec. 14	Laboratory Analysis	
Nov Dec.	Raw data QC	
January	Report results to Project Officer	

# 9. Project Organization and Responsibility:

The following is a list of key personnel and their corresponding responsibilities:

Sample Operations - Edward J. Kim, Field Team Leader

Sampling QC/QA - Diane Switzer, Field Q/A Officer

Laboratory Analysis - Bill Andrade, Chief of Chemistry Section

Laboratory QC - Bill Andrade

Data Validation - Bill Andrade

Overall Project Coordination - Barbara Newman, Site Project Officer

### 10. Sampling Procedure:

Monitoring wells will be sampled in accordance with appropriate Water Section protocol as outlined in EPA Region I. ESD Water Section's S.O.P., "Sampling Monitoring Wells for Organic Contaminants", as presented in Appendix SOP-1. Where conditions warrant, the S.O.P. may be altered with the approval of the Quality Assurance Officer prior to sampling initiation. Alterations shall also be approved by the site Project Officer. Any special circumstances or alternation from S.O.P. will be recorded in the field logbook.

The existing monitoring wells will be sampled in sequence proceeding from the least to most contaminated wells, UC4, UC6 and UC5 respectively, as determined on the basis of available information (Note UC7, UC9 and UC10 are multilevel wells each with its own sampling devices). Determination of the degree of contamination will be based upon results of previous analyses of samples obtained by ERT contractor from the existing wells and on field screening of soil and water samples during the drilling of the wells.

## 11. Sample Custody Procedures:

EPA Region I ESD Water Section's written procedures will be followed whenever the samples are collected, transferred, stored, analyzed or destoryed. The primary objectives of the procedures will be to create an accurate written record which can be used to trace the possession and handling of the sample from the moment of its collection to disposal.

Sample tags, chain-of-custody forms and field data records will be completed at the time of sampling. The following chain-of-custody procedure will be implemented by the Field Team Leader to assure sample integrity. Entries will be made in waterproof ink during sampling.

- A. The samples are under custody of the Field Team Leader if:
  - 1. they are in his/her possession,
  - 2. they are in view after being in possession,
  - they are locked up or sealed securely to prevent tampering, or
  - 4. they are in a designated secure area.
- B. The original of the chain-of-custody form must accompany the samples at all time after collection. A copy of the chain-of-custody form is kept by the Field Team Leader.
- C. When samples are transferred in possession, the individuals relinquishing and receiving will sign, data, and note the time on the chain-of-custody form.

The chain of custody-of-custody form will contain information to distinguish each sample from any other sample. This information will include:

- 1. The project for which sampling is being conducted.
- 2. The matrix being sampled (air, groundwater, soil, etc.).
- 3. The sampling date and time.
- 4. The specific sampling location in sufficient details to allow resampling at the sample location.
- 5. The method of sampling to include preservation techniques.
- 6. Significant observations made during the sampling process.
- 7. Signature of the person performing the sampling.

Each sample will be assigned a unique identification number, which will be marked on the sample tag accompanying each sample container in waterproof ink. The chain-of-custody form will be forwarded to the laboratory with the samples. As a precaution against this record being lost or altered, the sampling peronnel will retain a copy of the chain-of-custody form documenting all information up until the first change of sample custody. This record will be filed by the Field Team Leader.

## 12. Field Instrument Calibration and Preventive Maintenance:

Field meters to be used during sampling, including the pH and specific conductance/temperature meters, will be maintained and calibrated as per ESD Water Section S.O.P. requirements. The procedures for the HNu photoionization organic vapor detector are outlined in the S.O.P. Battery check with electronic zeroing of the instrument will be performed at 2-hour intervals during period of continuous use. In addition, buffer solutions and standard KCL solutions will be used in the field to calibrate the pH and conductivity meters. The preparation date of standard solutions will be clearly marked on each of the containers to be taken into the field. It will be the responsibility of the user to check the calibration status prior to using the instrument and to check its calibration periodically during use. A log which documents problems experienced with the instrument and corrective measures taken will be maintained by the Field Team Leader.

All equipment to be utilized during the field sampling will be examined to certify that it is in operating condition prior to its use. This includes checking the manufacturer's operating manuals and the instructions with each instrument to ensure that all maintenance items are being observed.

The Field Team Leader will assume responsiblity for control and calibration of field measurement equipment.

### 13. Data Quality Requirements and Assessment:

Parameter	Sample	Detection	Quantitation	Estimated	Estimated	Precision
	Matrix	Limit	Limit	Accuracy	Precision	Protocol
1. VOA	Water	(1)	ESD	requirements		·

(1) Refer to Attachment A. for detection limits for specific VOC's.

### 14. Data Comparability and Completeness:

- A. Data Comparability: Data must be comparable for all well samples, i.e., all analyzed with the same detection limits and method. Data from each well sample will be compared to other well sample data in the group of 23 samples, as well as to past existing databases.
- B. Data Completeness: At least 80% of the data must be valid to be accepted. If greater than 20% are determined to be invalid or incomplete, the Project Officer will decide if resampling any part is necessary.

### 15. Documentation, Data Reduction and Reporting:

- A. Documentation: All activities will be documented either in S.O.P. or modifications which must be first be approved by both Project Officer and Field QA Officer before use. Adequate documentation will be provided to insure that the data derived in sampling and analysis is justifiable, with respect to the sample and the requirements of the investigation. Each sample will be documented as to its place of origin, how the sample was taken, person performing collection and conditions relating to sample collection. In addition, members of the project staff working in the field operations will keep a field notebook of their project activities. Items to be included in the notebook, as appropriate, are; field activity subject; unusual events; visitors on site; air monitoring measurements (HNu).
- B. Data Reduction and Reporting: Raw data will be summarized and incorporated in report form. At the completion of the study, a final report will be submitted to the Project Officer. That report will detail in text supported by illustrations and tables the method of investigation, results of the field and analytical work and proposes. Appended to the report will be all appropriate field documentation, analytical data and QA/QC documentation.

### 16. Data Validation:

Data validation is a process of review of the analytical results and documentation against established criteria. NERL laboratory will perform the validation.

# 17. Performance and Systems Audits:

Office of Quality Assurance may conduct an audit to assess the level of adherence to this Work/QA Plan. Audits of field notebooks and other controlled field documents may also be conducted by the Office of Quality Assurance.

### 18. Correction Action:

When it is found that data is incomplete or that results are unacceptable, the following precedures for corrective action shall be understaken.

- A. Incomplete Data: Omissions from logs, notebooks and worksheets place the entire analysis in question. Incomplete field sampling data may require resampling of the questionable location. Incomplete laboratory data usually calls for re-introduction or re-analysis of the questionable sample if possible.
- B. Conflicting Data: As in the case of omitted data, conflicting data may require that the entire analytical performance be questioned. In some cases, however, other supportive documentation may aid in resolving problems in conflicting information. When this not available, the Project Officer may require re-sampling or re-analysis of samples if possible.
- C. Poor Performance: When results from duplicates, spikes, collocates, etc. fall outside of acceptable ranges, the available ranges, the available data will be reviewed by the Project Officer. Upon examination, all or some of the following actions may be applied:
  - 1. System audit for the analyte in question.
  - 2. Determination of matrix interference.
  - 3. Re-sampling of the questionable sample.
  - 4. Reconsideration of acceptance limits with statements included with results explaining the action/rationale taken.
  - 5. Rejection of data and exclusion from the report with written explaination.
  - 6. Rejection of the entire sample/site location with recommendation of relocation of sample site or reconsideration of results sought.

## 19. Reports:

The Field Team Leader shall submit to site Project Officer a report that details the method of investigation, results of the field and analytical work and purposes. The Field Team Leader shall append to the report all appropriate field documentation, analytical data and QA/QC documentation.

To be submitted to:

Barbara Newman, Project Officer MA Superfund Section (HRS) Waste Management Division

## Attachment A.

# US Environmental Protection Agency Region I Laboratory EPA Method 8240 GC/MS Purgeable Organic Analysis - Water

# Volatile Organic Compounds

Compound	Detection Limit (ug/l)
Priority Pollutants	
Chloromethane	30
Bromomethane	10
Vinyl Chloride	20
Chloroethane	20
Methylene Chloride	5
Trichlorofluoromethane	25
l,l-Dichloroethylene	5 .
1,1-Dichloroethane	5
1,2-Dichloroethylene isomers	5 5
Chloroform	25
1,2-Dichloroethane	25 5
1,1,1-Trichloroethane Carbon Tetrachloride	5 5
0010011 10111011111111	5
Bromodichloromethane	5 5
1,2-Dichloropropane	5
t-1,3-Dichloropropene	5
Trichloroethylene	5 5
Dibromochloromethane	20
c-1,3-Dichloropropene	20 5
1,1,2-Trichloroethane	10
Benzene	10
2-Chloroethylvinyl ether Bromoform	5
	5
Tetrachloroethylene	5
1,1,2,2-Tetrachloroethane Toluene	5
Chlorobenzene	. 5
	5
Ethylbenzene Acrolein	150
	150
Acrylonitrile	150
Hazardous Substances	<u>-</u>
Agatana	, 75
Acetone Carbon Disulfide	7.5 5
2-Butanone	75
	75 15
Vinyl Acetate	15
2-Hexanone 4-Methy1-2-Pentanone	5
Styrene	10
Xylenes (Total)	10
Ayrenes (Total)	10

APPENDIX SOP-1
Standard Operating Procedure

## STANDARD OPERATION PROCEDURE

Title: Ground-Water Sample Collection from Monitoring Wells Date of Issue: March 9, 1987

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### 1.0 Applicability

This Standard Operating Procedure (SOP) is concerned with the collection of valid and representative samples from ground-water monitoring wells. The scope of this document is limited to field operations and protocols applicable during ground-water sample collection

### 2.0 Equipment and Materials

The list below identifies the types of equipment which may be used for a range of ground water-sampling applications. From this list, a project-specific equipment list will be selected based upon project objectives, the depth to ground-water, purge volumes, analytical parameters and well construction. The types of sampling equipment are listed in Table I.

### 3.0 Water-Level Measurement

- 3.1 Introduction: Prior to otaining a water-level measurement, create a clean surface area onto which sampling equipment can be positioned and work can be performed. If necessary cut a slit in one side of a plastic bag and slip it over and around the well, to a create a clean space for the sampling equipment.
- 3.2 Well Security: Unlock and/or open the monitoring well. Note and record description of condition of the security system and protective casing at the well site, i.e., cap, lock, base.
- 3.3 Measurement: After unlocking and/or opening a monitoring well, the first task will be to obtain a water-level measurement. Water-level measurement will be made using a 100 foot long measuring tape with weight. Establish a measuring point. Typically, all depth measurements should be made from top (the highest point) of the protective or outermost well casing. The measuring point location should be describled in the field log book and should be used in all subsequent sampling efforts. Lower the water-level measurement tape and record the depth to water and total depth of the well. Care should be taken to assure that the water-level measurement device hanges freely in the monitoring well and is not adhering to the wall of the well casing. Record into field log book.

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# Sampling Monitoring Wells for Organic Contaminants

# Table I. Equipment List

### o Purging/Sample Collection

Bailer, Teflon or Stainless Steel Centrifugal Pump Submersible Pump Peristaltic Pump

## o Sample Preparation/Field Equipment

pH Meter w/ standards Specific Conductance Meter Thermometer Chlorine Residual Meter Filtration Apparatus Water-Level Measurement Equipment

Additional equipment to support sample collection and provide baseline worker safety will be require to some extent for each sampling task. The additional materials are separated into two primary groups: general equipment which is reusable for several sampling, and materials which are expendable.

### o General

Project-specific sampling program
Decontamination and Cleaning solutions (Distilled-water, Methanol\*
in Telfon wash bottle, Detergent solution, Tap water)
Site-specific Health & Safety equipment (gloves, respirators,
goggles)
Field data sheets and log book
Preservation solutions
Sample containers
Buckets and intermediate containers
Coolers and ice and/or ice packs
First Aid kit

### o Expendable Materials

Bailer Cord (braided nylon or braided cotton line, 1/8" diameter or smaller, do not use monofilament fishing line).
Respirator Cartridges
Gloves (chemical resistant)
Chemical-free paper towels
Trash containers

Hexane or methylene chloride (in order of preference) may also be used if so noted Title: Ground-Water Sample Collection

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3.4 Decontamination: The measurement device shall be decontaminated immediately after use with a methanol soaked towel. Generally, only that portion of the tape which enters the water table should be cleaned. It is important that the measuring tape is never placed directly on the ground surface.

## 4.0 Monitoring Well Purging

4.1 Purge Volume Computation: Monitoring wells should be purged, at a minimum, the equivalent of three volumes of standing water or continue evacuating water until conductivity and temperature stablize. The volume of water present in each well shall be computed based on the length of water column and well casing diameter. The water volume shall be computed using the formula given below:

$$V = 0.041 D^2 (d_2 - d_1)$$

V = Volume in gallons

D = Inside diameter of well casing in inches

 $d_2$  = Total depth of well in feet

d<sub>1</sub> = Depth to water surface in feet

- 4.2 Well-Purging Methods: Purging must be performed for all ground-water monitoring wells prior to sample collection in order to remove stagnant water from within the well casing and ensure that a representative asmple is obtained. Three general types of equipment are used for well purging; bailers, surface pumps, or down-well submersible pumps. In all cases pH, temperature, and specific conductance will be monitored during purging. The data values shall be recorded into the field log book.
- 4.3 Decontamination: The purging equipment shall be decontaminated immediately after use to ensure against cross-contamination from one well to the next well.
  - 4.3.1 Bailers: If a bailer is used to purge the well, immediately flush interior surfaces with distilled water or potable water. Add clean detergent solution to bailer, cover the ends, and slosh solution end to end while rotating the barrel to ensure washing of all interior surfaces. Dump spent detergent solution in a waste collection vessel. Using absorbert wipes, thoroughly rinse exterior surfaces three times with distilled water or potable tap water. Rinse the interior of bailer with distilled water three times. Using a teflon wash bottle designated for use with

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a specific solvent (typically methanol), squirt solvent on the inside of the bailer's barrel and rotate the bailer to flush the entire surface, then cover ends and slosh solvent end to end while rotating the barrel of the bailer. Dump spent spent solvent in a designated waste container. Repeat this solvent rinse process three times. Rinse the exterior surface of the bailer with solvent and wipe dry wiht a chemical resistent wipe. Repeat this process three times as well. Dispose of all wipes and spent solutions in appropriate containers and return them to the laboratory.

- 4.3.2 Bailer Cord: The wetted or contaminated portion of braided nylon of braided cotton cord can be cut and disposed of.
- 4.3.3 Pumps: If a pump is used, pump one gallon of potable water or distilled water through immediately after use. Wash or wipe the exterior surface of the pump hose with a detergent solution and rinse or wipe three times with distilled water. Thoroughly wash or wipe three times with solvent (typically methanol) and allow to air dry before reuse.

### 5.0 Sample Collection Procedures:

5.1 VOC Sample: All ground-water collected from monitoring wells for subsequent volatile organic compound analyses shall be collected using bailers, regardless of purge method.

Obtain a clean/decontaminated bailer, withdraw and waste three bailers full of well water prior to collecting sample for analyses. Withdraw a sample from the well, transfer the sample from the bailer directly into a 40 ml glass vial (pre-spiked with 4 drops of conc. HCL) by pouring the sample down the side of the container with minimum turbulence. This procedure is critical to minimize loss of volatile materials from the sample through aeration. Seal the sample container with telfon-lined caps. Two 40 ml glass vials will be collected for each sample.

5.2 VOC Sample Preservation: Ground-water samples for VOC analysis by EPA Method 8240 requires the sample to be treated with 4 drops of concentrated HCL immediately upon collection. Prior to sample collection, each VOA vial will be spiked with 4 drops of concentrated HCL. Once the sample is acidified it will be cooled and stored at 4°C.

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5.3 Decontamination: The decontamination procedure is to be completed immediately following sample collection. The procedure followed is outlined in Section 4.3.1 (Procedure for Decontamination of Bailers) of this Appendix SOP-1.